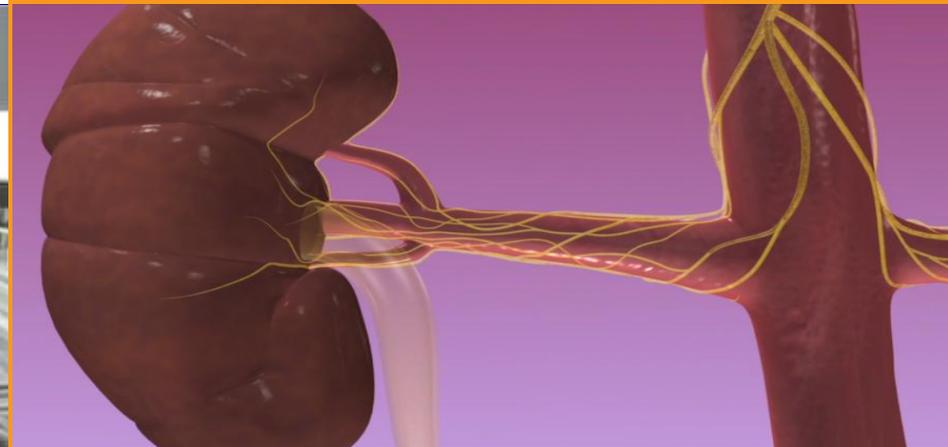


Tato přednáška je podporována  
společností Medtronic

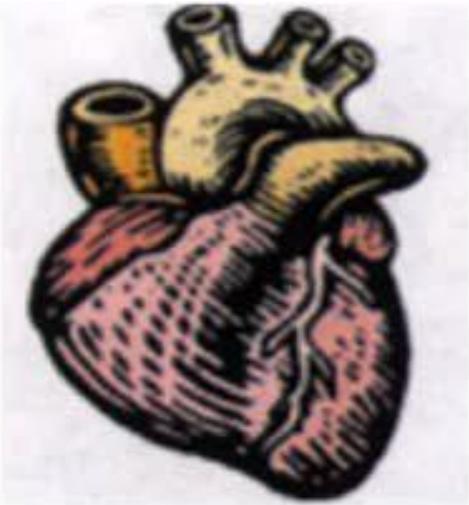
# Renální denervace:

radiofrekvenční energie, UZ, alkohol?



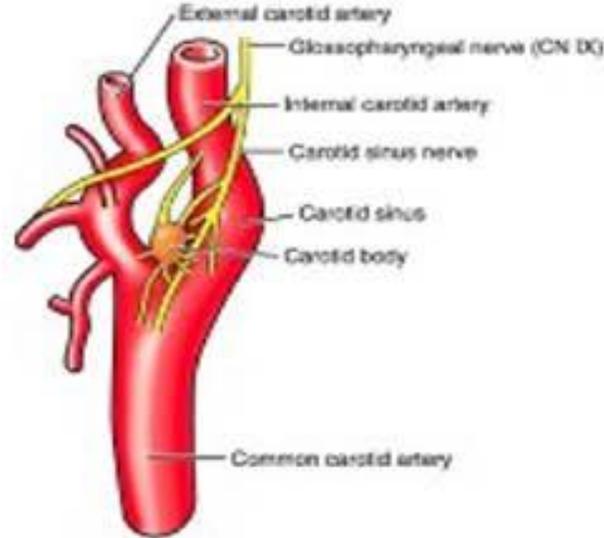
# How Does Sympathetic Nervous Activation Cause Hypertension?

## Heart (8,10, 38)



High cardiac output initiates process

## Arteries (39,40)



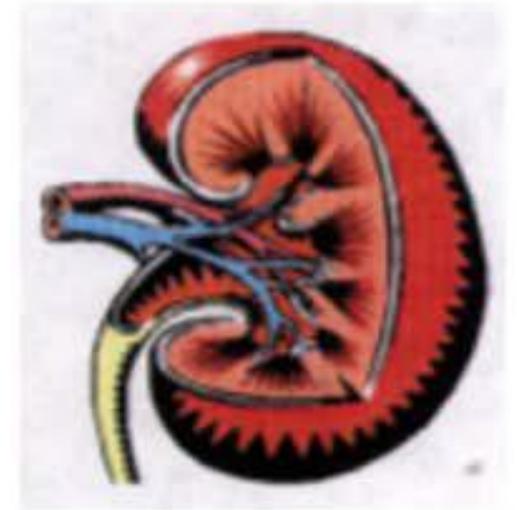
Neural reduction in arterial distensibility

## Arterioles (19,24,41)



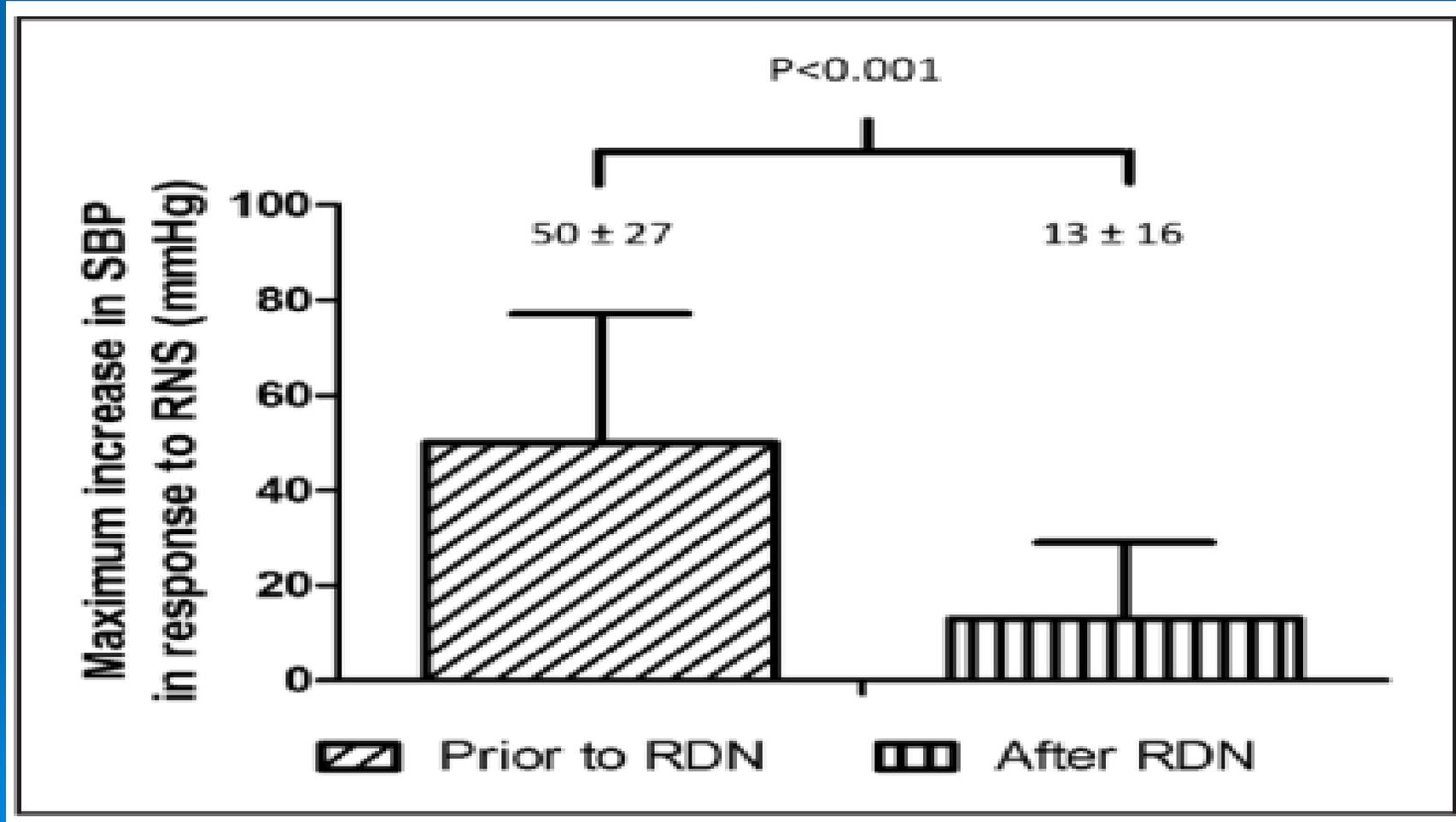
Sympathetic nervous vasoconstriction

## Kidneys (37,42)



Neural increase in sodium reabsorption, renin release

# Stimulation of renal SNS and prediction of BP response?





# Rezistentní hypertenze: definice

- **Klinický krevní tlak 140/90 mmHg nebo vyšší (135/85 mmHg a vyšší při domácím měření) navzdory léčbě kombinací nejméně tří antihypertenziv včetně diuretik v maximálních tolerovaných dávkách**
- **Prevalence (true prevalence) cca 5%??**



# Prevalence rezistentní hypertenze?

Population Based	Time Period	n	Uncontrolled With $\geq 3$ BP Medications, %	Controlled With $\geq 4$ BP Medications, %	aTRH, %
NHANES <sup>13</sup>	1988–1994	2755	8.3	1.1	9.4
NHANES <sup>13</sup>	1999–2004	3031	8.8	2.9	11.7
NHANES <sup>14</sup>	2003–2008	3710	...	...	12.8
NHANES <sup>13</sup>	2005–2008	2586	9.7	4.8	14.5
REGARDS <sup>15</sup>	2003–2007	14 731	9.1	5.0	14.1
REGARDS <sup>16</sup> (CKD)*	2003–2007	3134	...	...	28.1
Clinic based					
EURIKA <sup>17</sup> (diabetes mellitus)	2009–2010	5220	13.0†	3.1	16.1
Spanish ABPM <sup>18</sup>	2004–2009	68 045	12.2	2.6	14.8
CRIC (CKD) <sup>19‡</sup>	2003–2008	3939	21.2	19.2	40.4
South Carolina <sup>20§</sup>	2007–2010	468 877	9.5	8.4	17.9
Clinical trials					
ALLHAT <sup>21</sup>	1994–2002	14 684	11.5	1.2	12.7
ASCOT <sup>22</sup>	1998–2005	19 527	48.5	...	...
ACCOMPLISH <sup>25</sup>	2003–2006¶	10 704	39	...	...
INVEST <sup>26</sup>	1997–2003#	17 190	25.1	12.6	37.8

*AHA statement, Hypertension. 2018;72:e53-e90.*

# Renal denervation: controversial results in HT SIMPLICITY HTN 1 and 3

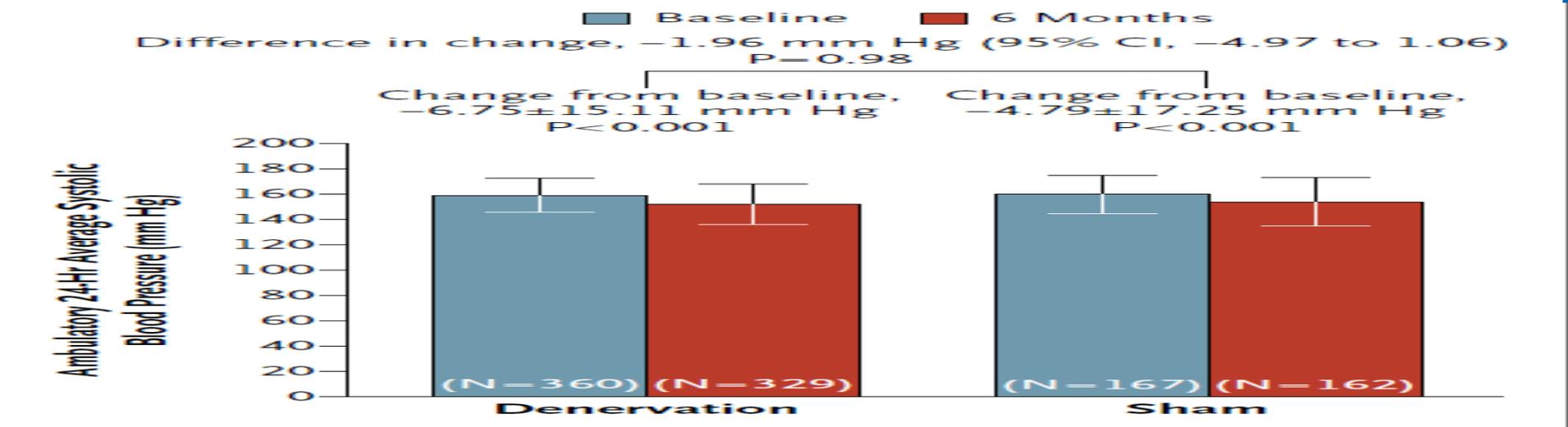
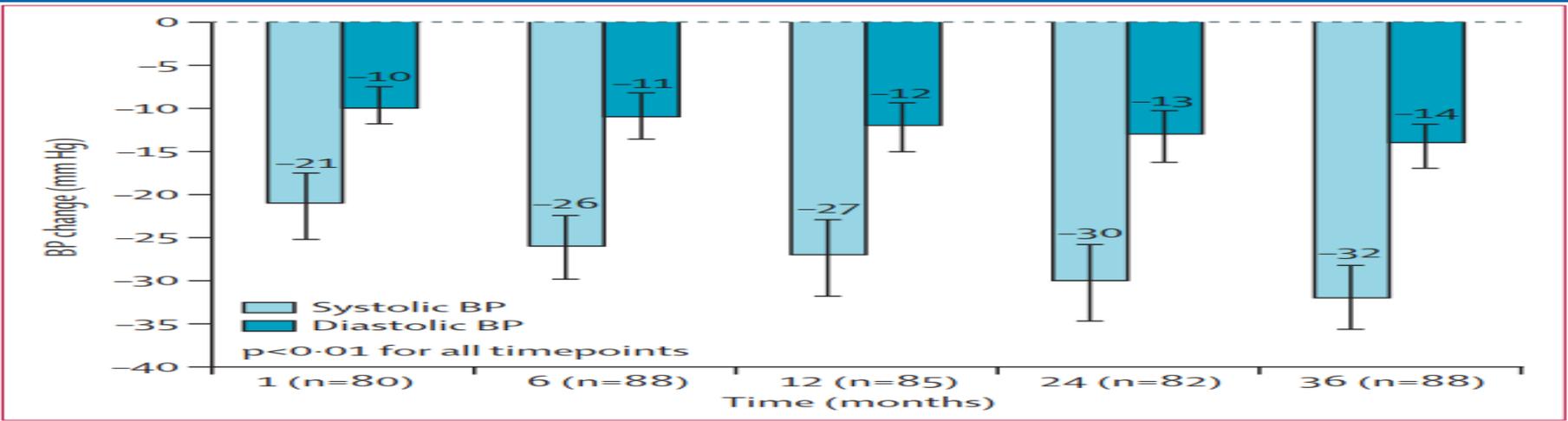
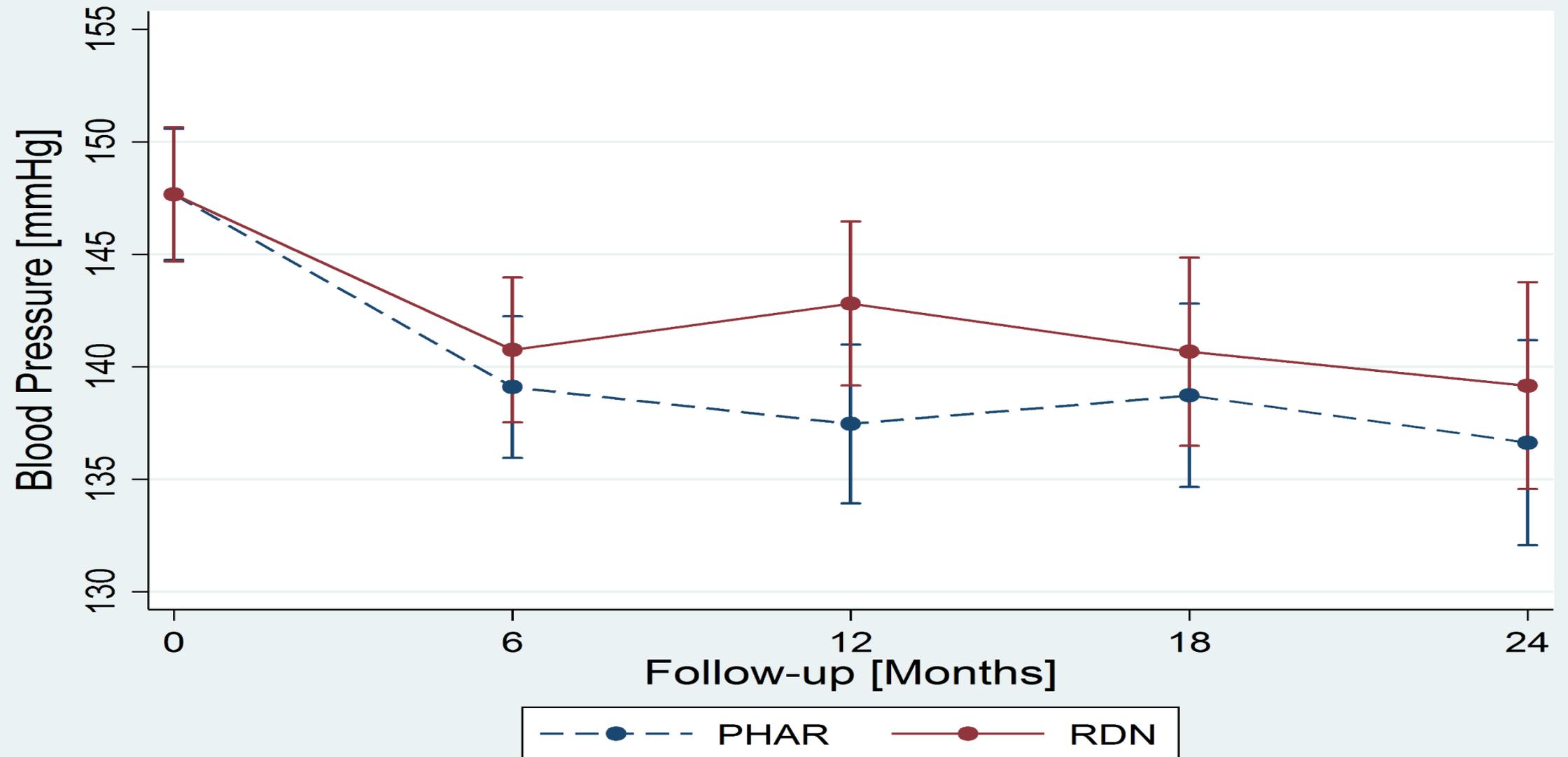
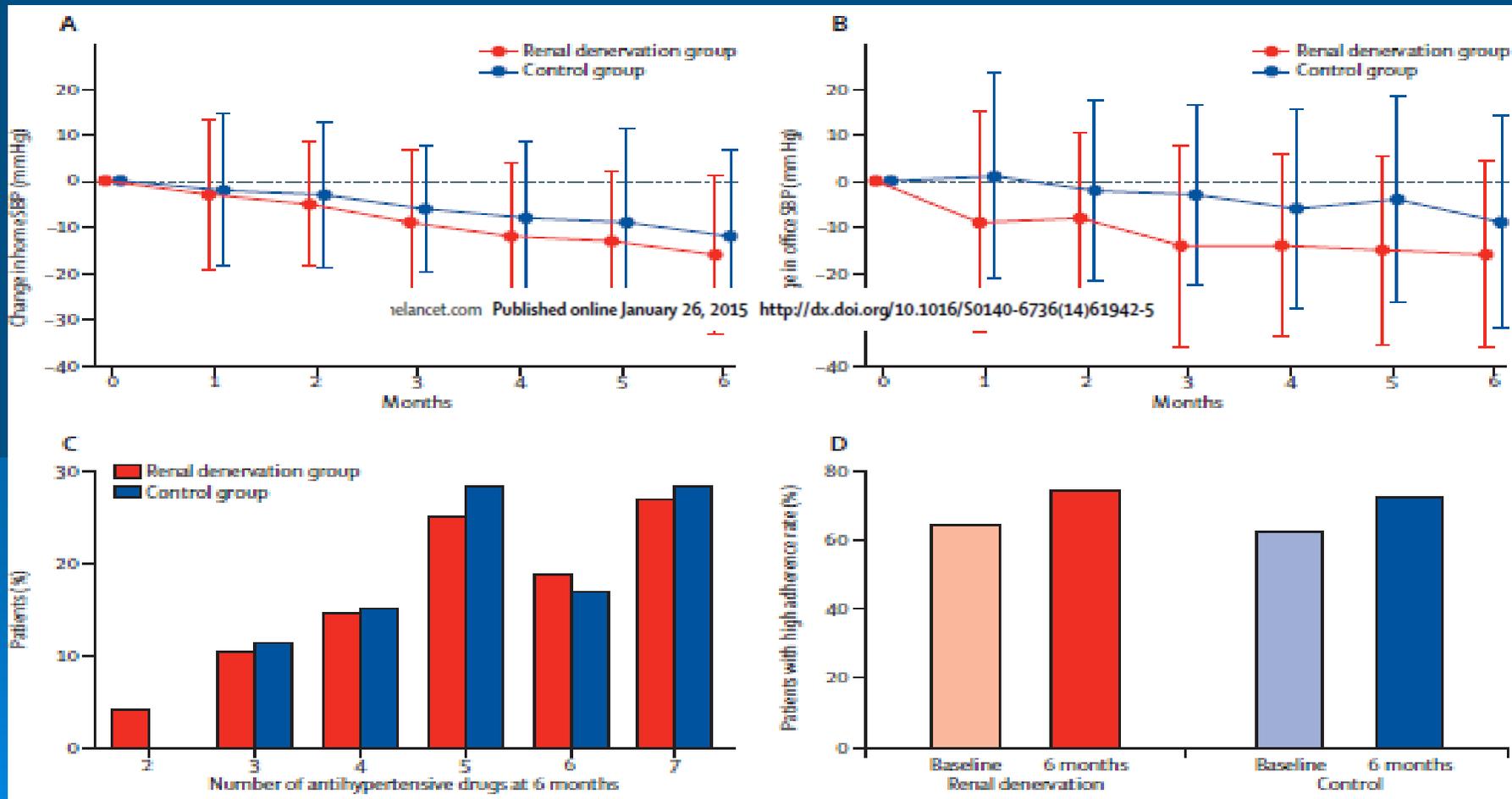


Figure 2. Secondary Efficacy End Point.

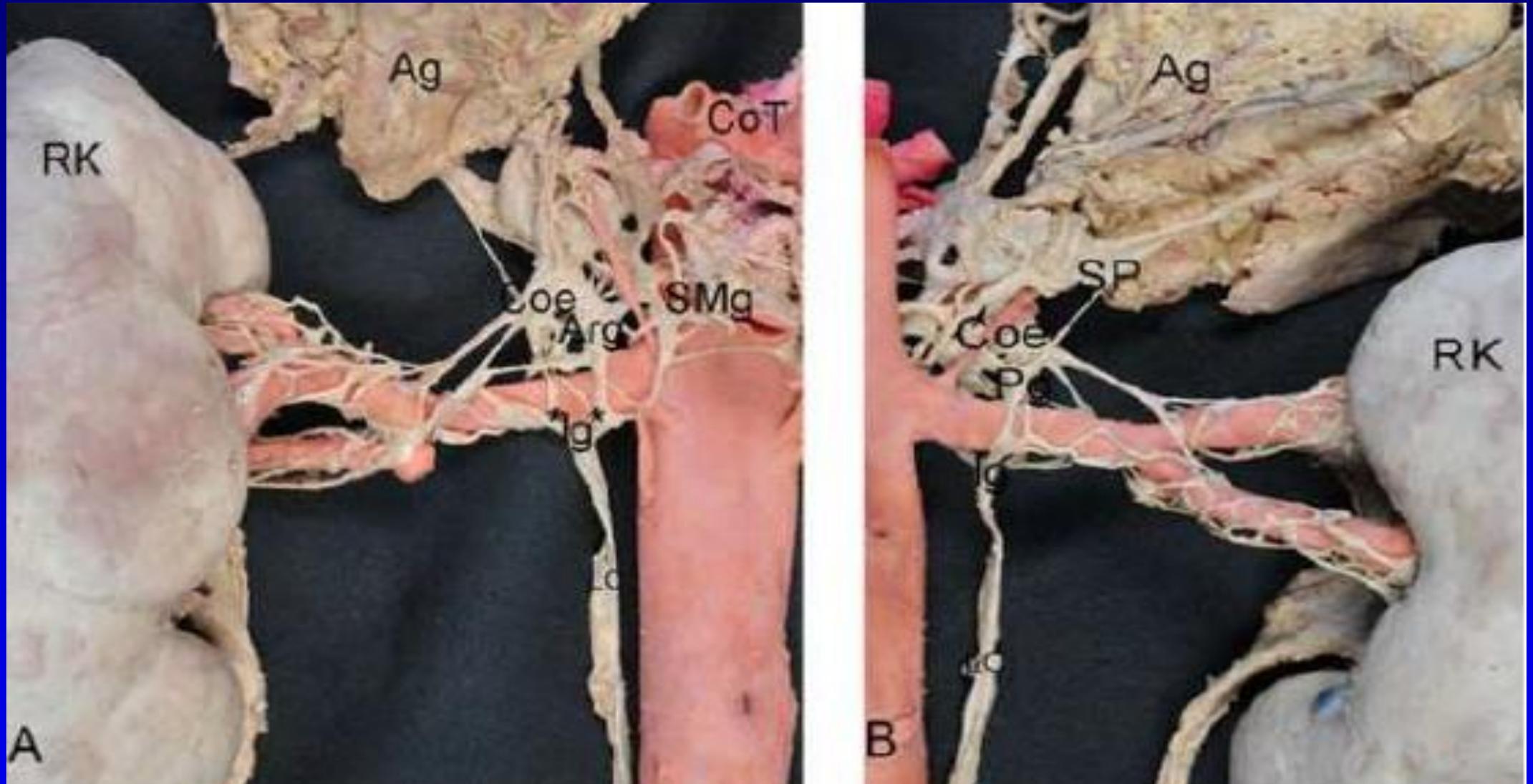
# Studie Prague 15: 24 hod. STK ve dvouletém sledování



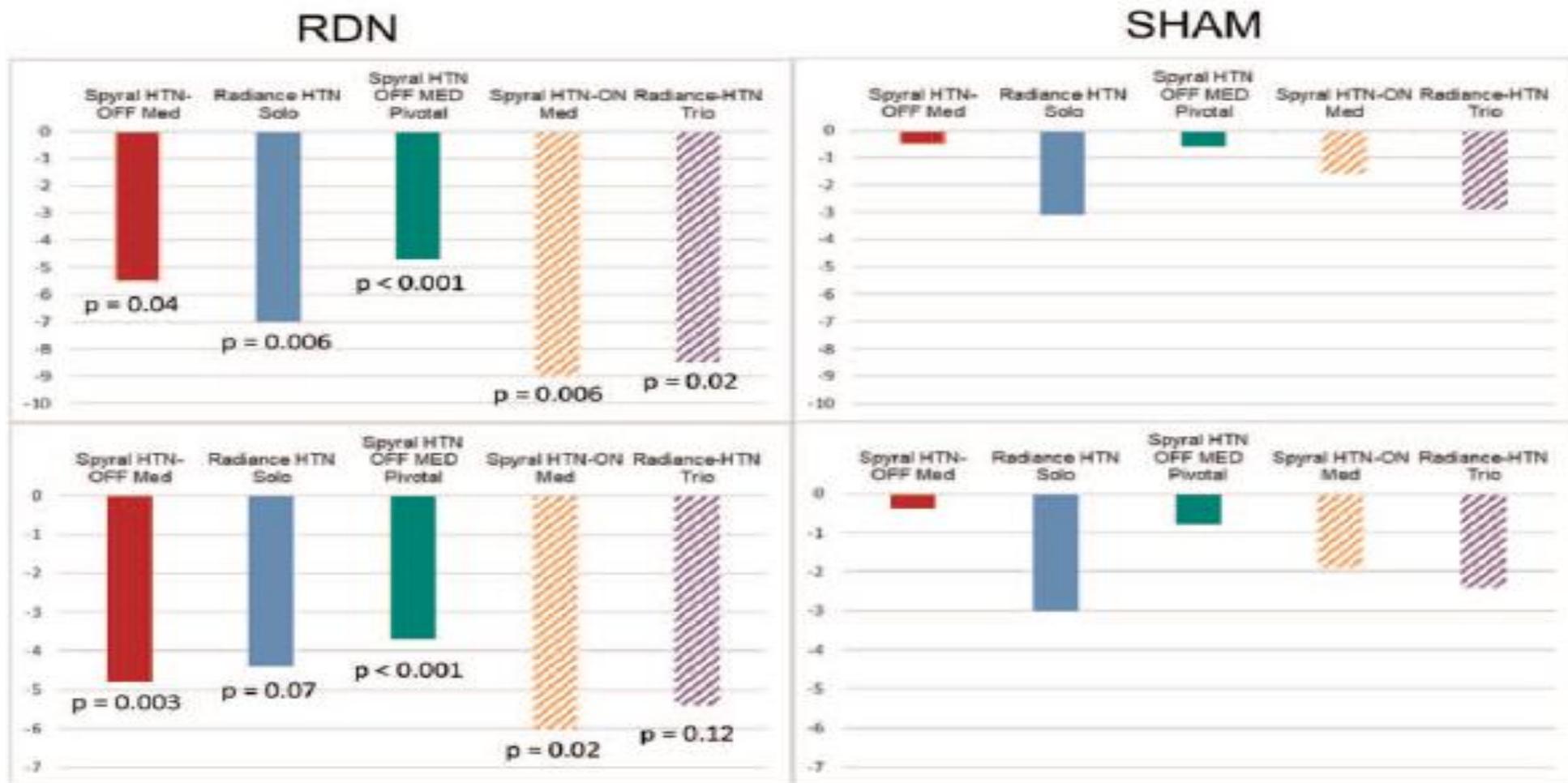
# Studie DENERHTN: domácí a klinický TK



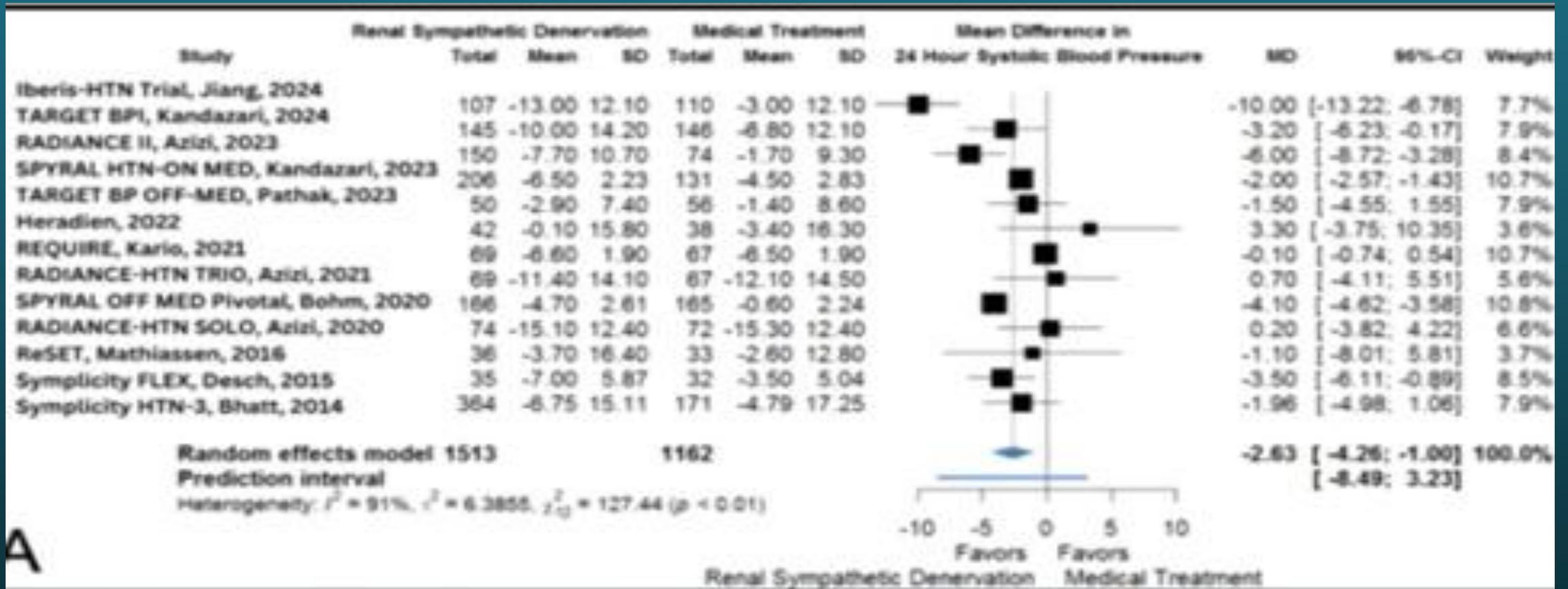
# Nové přístupy: RF ablace distálnějších větví, vyšší počet ablací



# Sham controlled clinical trials: change in 24-h ABPM



# RDN in resistant HT: metaanalysis of sham controlled trials

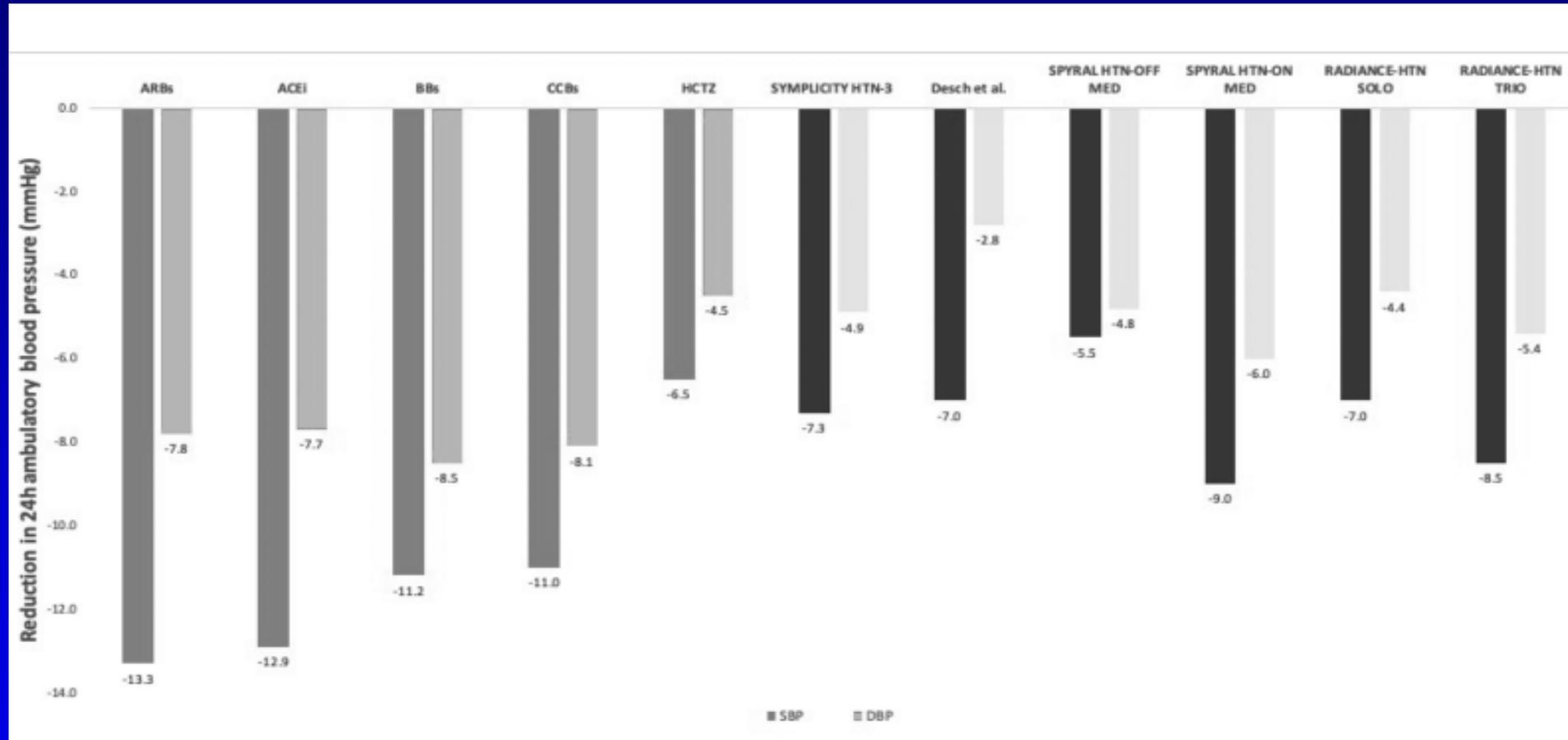


# Antihypertenzní účinky univerzálních látek a RDN

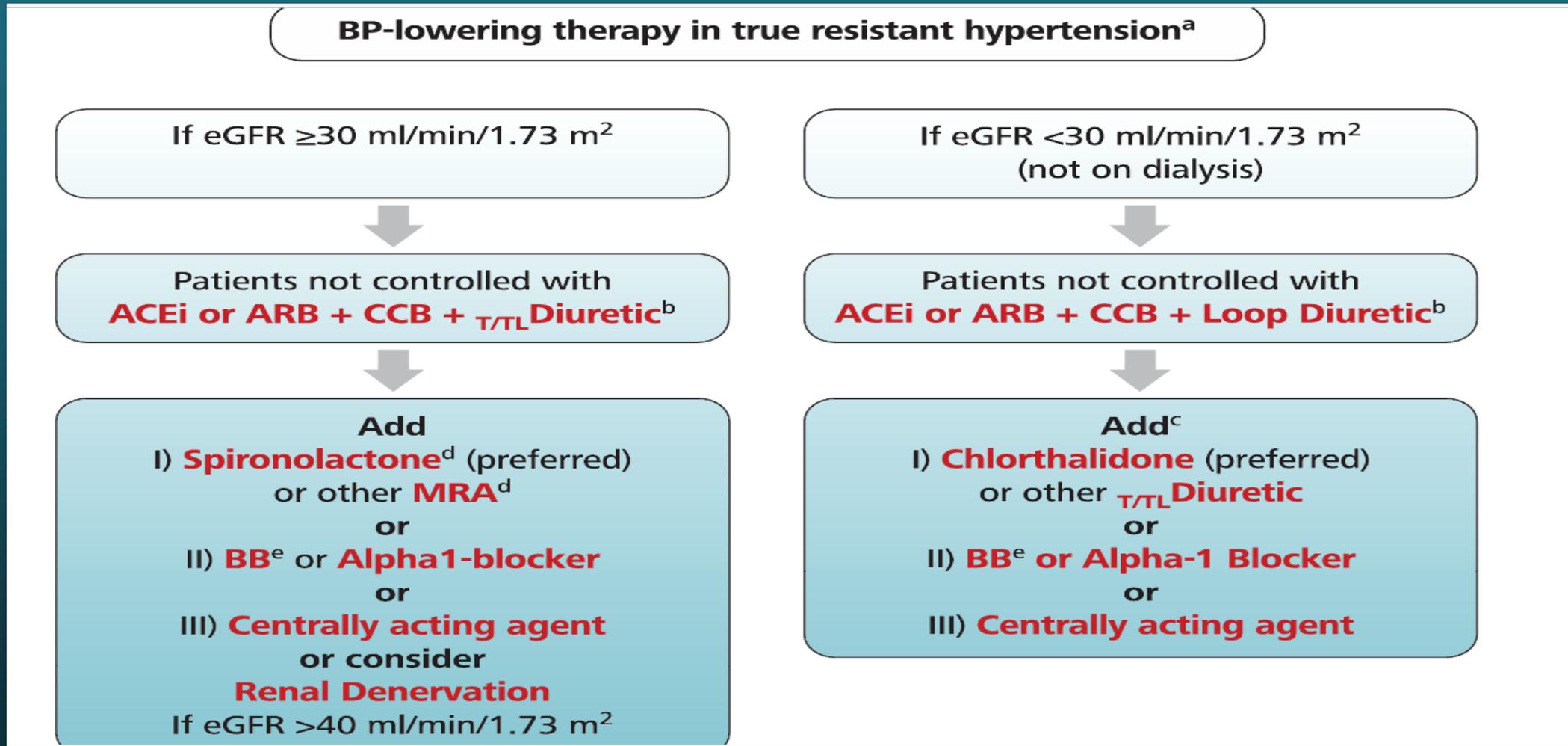
TABLE 2. Antihypertensive effects of beta-blockers, RAS blockers, calcium-channel blockers, thiazides, and renal denervation.

	Beta-blockers	RAS blockers	Calcium-channel blockers	Thiazides	Renal denervation
BP decrease, sustainability	years, decades	years, decades	years, decades	years, decades	months
BP paradox responders	yes	?	no	no	yes
BP variability	?	?	↓↓↓	↓↓	↓
BP decrease age dependent	yes	yes	no	no	yes
Heart rate	↓↓	no	no	no	↓
Plasma renin activity	↓↓	↓↓↓	?↑	↑↑	↓↓
Sympathetic activity	↓↓	↓	no	↑	↓↓
Morbidity and mortality	inconsistent evidence	↓↓	↓↓	↓↓↓	no evidence

# Reduction in 24 h BP by individual antihypertensive therapy and sham-control RCT



# Resistant hypertension: ESH guidelines



# ESH guidelines 2023

Drugs that can be considered as additional therapy in patients with true resistant hypertension are preferably spironolactone (or other MRA), BBs, alpha-1 blockers, centrally acting agents (clonidine), or amiloride (if available).	II	B
Thiazide/Thiazide-like diuretics are recommended in true resistant hypertension if estimated eGFR is $\geq 30$ ml/min/1.73 m <sup>2</sup> .	I	B
Loop diuretics may be considered in patients with an estimated eGFR $< 45$ ml/min/1.73 m <sup>2</sup> and should be used if eGFR falls below 30 ml/min/1.73 m <sup>2</sup> .	I	B
Chlorthalidone (12.5 to 25 mg once daily) can be used with or without a loop diuretic if eGFR is $< 30$ ml/min/1.73 m <sup>2</sup> .	II	B
RDN can be considered as an additional treatment option in patients with true resistant hypertension if eGFR is $> 40$ ml/min/1.73m <sup>2</sup>	II	B
Patients with true resistant hypertension should be followed very closely. Follow-up includes periodical ABPM and assessment of HMOD, particularly kidney function and serum potassium levels. Regular use of HBPM and monitoring of drug adherence are desirable.	I	C



# ESH guidelines 2023

Recommendations and statements	CoR	LoE
RDN can be considered as a treatment option in patients with an eGFR >40 ml/min/1.73m <sup>2</sup> who have uncontrolled BP despite the use of antihypertensive drug combination therapy, or if drug treatment elicits serious side effects and poor quality of life.	II	B
RDN can be considered as an additional treatment option in patients with true resistant hypertension if eGFR is >40 ml/min/1.73m <sup>2</sup> .	II	B
Selection of patients to whom RDN is offered should be done in a shared decision-making process after objective and complete patient's information.	I	C
RDN should only be performed in experienced specialized centers to guarantee appropriate selection of eligible patients and completeness of the denervation procedure.	I	C

# Léčba rezistentní hypertenze: ESC guidelines

In patients with resistant hypertension in whom spironolactone is not effective or tolerated, treatment with eplerenone instead of spironolactone,<sup>503</sup> or the addition of a beta-blocker if not already indicated<sup>459</sup> and, next, a centrally acting BP-lowering medication,<sup>515</sup> an alpha-blocker,<sup>515</sup> hydralazine, or a potassium-sparing diuretic<sup>516</sup> should be considered.

**IIa**

**B**

To reduce BP, and if performed at a medium-to-high volume centre, catheter-based renal denervation may be considered for resistant hypertension patients who have BP that is uncontrolled despite a three BP-lowering drug combination, and who express a preference to undergo renal denervation after a shared risk-benefit discussion and multidisciplinary assessment.<sup>564,566–568,586–590</sup>

**IIb**

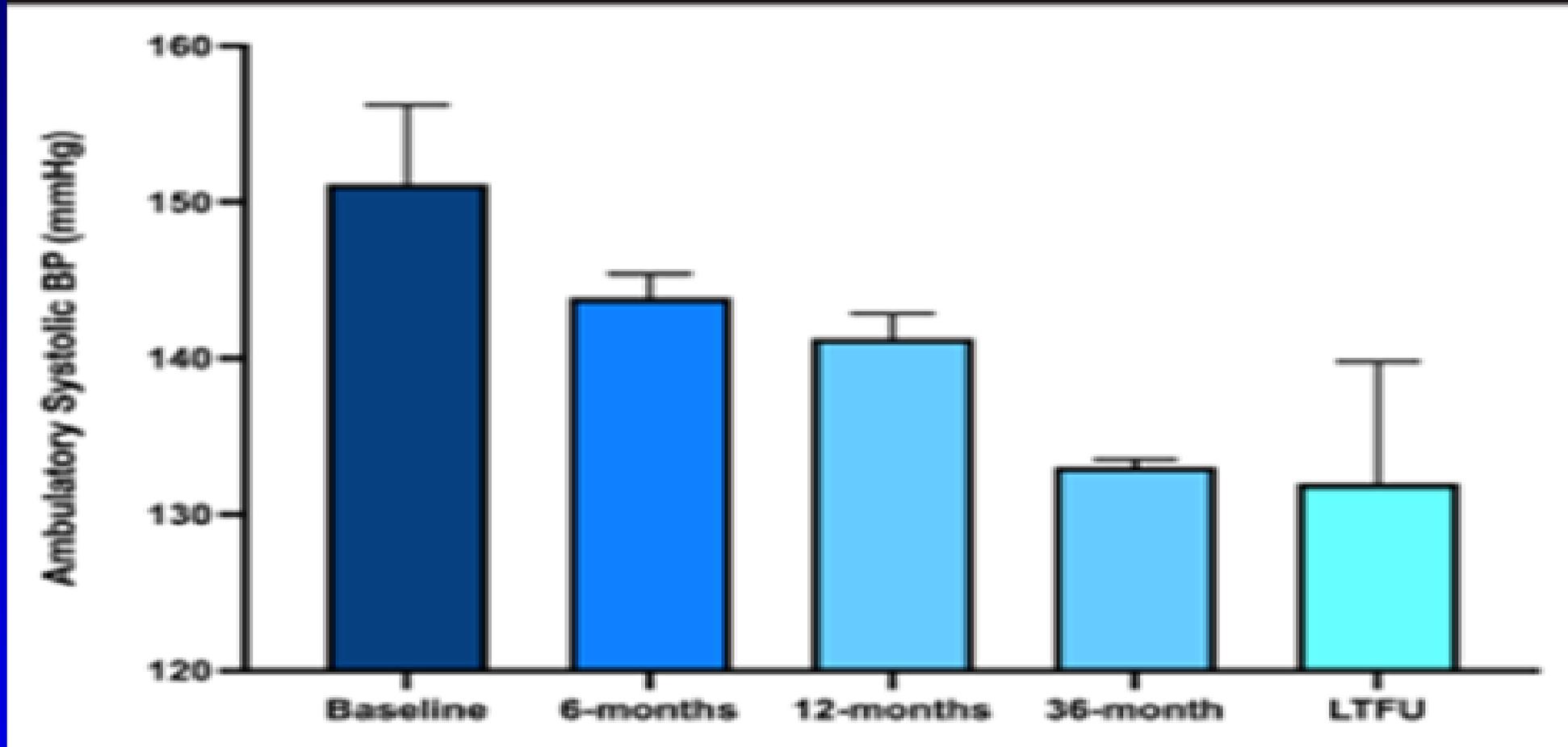
**B**



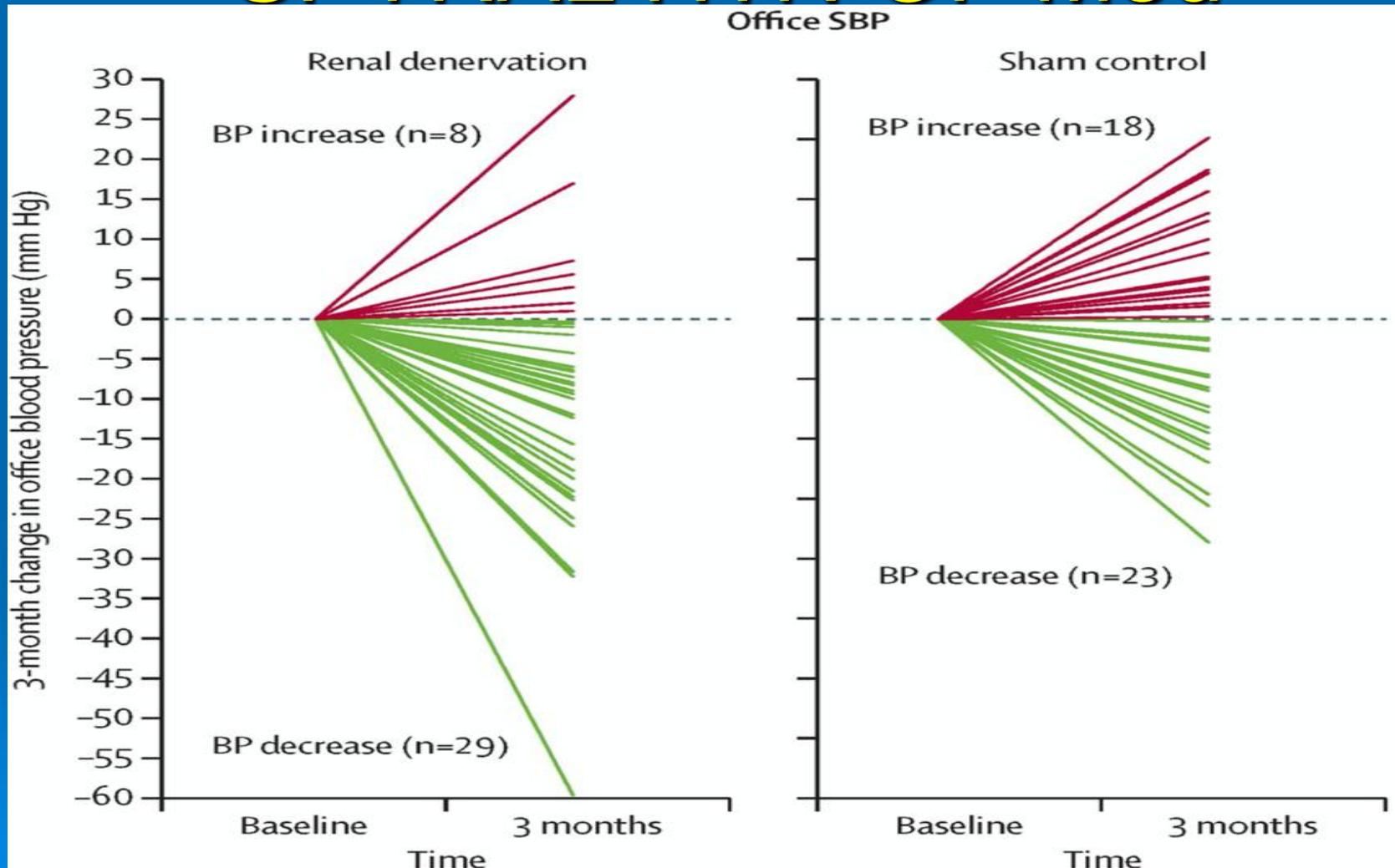
# Renální denervace- otazníky

- **Prediktory poklesu TK po RDN/účinnosti metody**
- **Přímé srovnání různých technik denervace**
- **Dlouhodobé (nad 3 roky)antihypertenzní účinky?**
- **Reinervace?**
- **Bezpečnost v dlouhodobém horizontu?**
- **Bezpečnost u renální dysfunkce (GFR pod 40 ml/min per 1,73m<sup>2</sup>**
- **Randomizované studie u hypertenzních komorbidit/ HF,CKD,AF/**
- **Ekonomická výhodnost?**
- **Dlouhodobý outcome?**

# Long-term data on RDN?



# Individual BP response to RDN in SPYRAL HTN OF Med



# Analysis investigating predictive value for waveform parameters and HR to predict response to RDN: Mobil-O-Graph PWA

measurement	AUC	95% CI	P value
Alx	0,70	0,61-0,79	0,001
Alx75	0,62	0,52-0,71	0,02
AP	0,74	0,64-0,82	0,0001
Pb	0,70	0,61-0,79	0,0001
PI	0,65	0,55-0,74	0,004
ePWV	0,62	0,53-0,71	0,03
HR	0,62	0,52-0,71	0,02
SBP	0,54	0,44-0,63	0,48



# **XLII. KONFERENCE**

ČESKÉ SPOLEČNOSTI PRO HYPERTENZI

# **XXXIV. KONFERENCE**

ČESKÉ ASOCIACE PREVENTIVNÍ  
KARDIOLOGIE ČKS

**2.-4. 10. 2025**

VIENNA HOUSE DIPLOMAT PRAGUE,  
Evropská 370/15, Praha 6

Děkuji za pozornost